

## PATENT ABSTRACTS OF JAPAN

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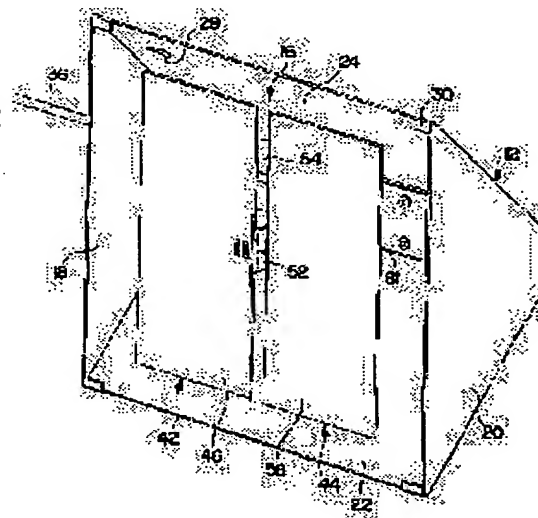
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## (54) ANTENNA SYSTEM AND ITS MANUFACTURING METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a low-cost and high-performance antenna system for outdoor use which is easy to manufacture and to assemble and is easy to fix.

SOLUTION: An antenna dipole 16 is fitted to the inside of a housing 12 and has two dipole members 42 and 44. A transmission balun member 52 is held in parallel at a prescribed interval to provide a prescribed electromagnetic connecting state between the members 42 and 44. An antenna cable 36 is extended through the top panel 18 of the housing 12. The outer conductor of the cable 36 is connected to the member 52 of one of the members 42 and an outer conductor is connected to a dipole element 46.



## LEGAL STATUS

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**CLAIMS**


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**[Claim(s)]**

[Claim 1] Housing which has at least one housing panel which demarcates a reflector in antenna equipment, Are the dipole antenna arranged in this housing, and it has the first dipole member and the second dipole member which were both combined electromagnetic. The dipole member of this first has the dipole element of the first rectangle, and said second dipole member has the dipole element of the second rectangle. Antenna equipment with which the first and second dipole members are equipped with one cable of elongation and said dipole member connected electrically said dipole antenna substantially arranged on the same flat surface, and in said housing.

[Claim 2] In the equipment by claim 1, the first dipole member has the first transmission balun (balun) member and the first installation plate. The second dipole member has the second transmission balun member and the second installation plate. The said first and second installation plates are attached in housing. The first and second transmission balun members are separated in parallel substantially mutually, only a predetermined distance has the first substantially perpendicular transmission balun member to the first dipole element, and the second transmission balun member is perpendicular equipment substantially to the second dipole element.

[Claim 3] Equipment formed in the piece of a metal which the first dipole element, transmission balun member, and installation plate were formed in the single piece of a metal, and the second dipole element, transmission balun member, and installation plate formed in the shape of a single in the equipment by claim 2.

[Claim 4] Equipment with which a cable is attached between the first and second transmission balun members in the equipment by claim 2.

[Claim 5] Equipment with which a cable is attached in the first dipole member in the equipment by claim 4.

[Claim 6] the equipment by claim 5 — setting — the outside of a cable — a conductor connects with the first transmission balun member electrically — having — the inside of a cable — the equipment by which a conductor is electrically connected to the first dipole element.

[Claim 7] the equipment by claim 6 — setting — the outside of said cable — a conductor connects with the first transmission balun member by the part which the first transmission balun member kept pushing — having — the inside of said cable — the equipment with which a conductor is connected to the first dipole element by the part which the first dipole element kept pushing.

[Claim 8] Equipment with which a cable is connected to the first transmission balun member by the sequestrum (stand-off) in the equipment by claim 5 so that this cable may be made to separate from the first dipole member, and said sequestrum is formed of the first transmission balun member.

[Claim 9] Equipment connected to a rectangular posterior part panel so that housing may have the first and second flank panels by which it received mutually and the include angle was attached in about 90 E and can form the gestalt of the corner of a truncated cone form in the equipment by claim 1.

[Claim 10] Equipment with which housing is further equipped with a trapezoid top panel and a trapezoid pars-basilaris-ossis-occipitalis panel in the equipment by claim 9.

[Claim 11] Equipment which housing is further equipped with the radome (radome) of a before side panel, and is attached in the flank panel of housing dismountable in the equipment by claim 1 with the clip with which the radome of said before side panel was extended.

[Claim 12] Equipment with which antenna equipment offers reception and the transmission function of high performance within the limits of 800 thru/or 1050MHz in the equipment by claim 1.

[Claim 13] The flank panel with an include angle which received mutually and has been arranged in the antenna which receives and transmits a cel-like band frequency at the include angle of about 90 E, This housing whose

panel of this housing it is housing which has a trapezoid top panel and a pars-basilaris-ossis-occipitalis panel, and the posterior part panel that demarcates the corner gestalt of a truncated cone form, and is an antenna reflector, The first long and slender transmission balun member which is the first dipole member arranged in this housing, and was connected to the first dipole element and the dipole element of this first, It has the first installation plate connected to the first transmission balun member and posterior part panel, and the first transmission balun member receives the first dipole element. Substantially Said first perpendicular dipole member, the second dipole member arranged in this housing — it is — the second dipole element — this — with the second long and slender transmission balun member connected to the second dipole element It has the second installation plate connected to the second transmission balun member and posterior part panel, and the second transmission balun member receives the second dipole element. Substantially Said second perpendicular dipole member, A conductor is electrically connected to the first transmission balun member. the coaxial cable which penetrates housing and is extended — it is — the outside of this cable — the inside of this cable — the antenna which a conductor is electrically connected to the first dipole element, and is equipped with said coaxial cable extended along with the first balun member in between the first balun member and the second balun member.

[Claim 14] The antenna whose first and second dipole elements are rectangular plates in the antenna by claim 13.

[Claim 15] The antenna with which the first and second dipole elements are arranged on the same flat surface in the antenna by claim 14.

[Claim 16] It sets at the antenna by claim 13, and is an parallel antenna substantially [ the first and second transmission balun members counter mutually and ].

[Claim 17] Equipment with which a cable is connected to the first transmission balun member by the sequestrum in the equipment by claim 13 so that this cable may be made to separate from the first dipole member, and said sequestrum is formed of the first transmission balun member.

[Claim 18] the equipment by claim 13 — setting — the outside of said cable — a conductor connects with the first transmission balun member by the part which the first transmission balun member kept pushing — having — the inside of said cable — the equipment with which a conductor is connected to the first dipole element by the part which the first dipole element kept pushing.

[Claim 19] Equipment which housing is further equipped with the radome of a before side panel, and is attached in the flank panel of housing dismountable in the equipment by claim 13 with the clip with which the radome of a before [ this ] side panel was extended.

[Claim 20] The step which offers housing which has at least one housing panel which demarcates a reflector in the approach of offering antenna equipment, It is the dipole antenna which has the first dipole member and the second dipole member. The step which offers said dipole antenna with which the first dipole member has the dipole element of the first rectangle, and said second dipole member has the dipole element of the second rectangle, The dipole element of the first and the second rectangle is on the same flat surface substantially. The step which attaches the first dipole member and the second dipole member in housing so that both the first dipole member and the second dipole member may be connected electromagnetic, An approach equipped with the step which lengthens a cable in housing and connects this cable electrically [ a dipole member ] to one.

[Claim 21] In the approach by claim 20, the step which offers a dipole antenna so that the first dipole element, the first transmission balun member, and the first installation plate may be included So that forming the first dipole member from the single piece of a metal, the second dipole element, the second transmission balun member, and the second installation plate may be included The step which is equipped with forming the second dipole member from the single piece of a metal, and attaches a dipole antenna in housing How for the first and second transmission balun members to receive mutually, and include connecting the first and second installation plates to housing electrically so that it may be parallel and a balun can be demarcated.

[Claim 22] An approach including offering housing which has the first and second flank panels connected to the rectangular posterior part panel so that the step which offers housing might receive mutually in the approach by claim 20 at about 90 E, and an include angle might be attached and the corner gestalt of a truncated cone form could be formed.

[Claim 23] the step which connects a cable to the first dipole member in the approach by claim 20 — the outside of a cable — connecting a conductor to the first transmission balun member of the first dipole member, and the inside of a cable — an approach including connecting a conductor to the first dipole element.

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[Translation done.]

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DETAILED DESCRIPTION

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## [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the low cost for an antenna and indoor [ which more specifically adopt reflector housing of 90E truncated cone form, and a rectangular dipole element ], and the directive cel-like band antenna of high performance as a whole.

[0002]

[Related Art] The communications aerial of much form exists in the technical field concerned. Each of various designs of an antenna must operate proper with specific actuation bandwidth. It must receive effectively and the antenna for cel type telephones must transmit the signal of 800 thru/or 1050MHz within the limits. A certain building ingredient may attenuate a cel band signal notably, and, thereby, may reduce the capacity for telephone to operate effectively indoors. For this reason, it is desirable to offer a cel-like band antenna in the room electrically connected to the external antenna or an internal tooth space in order to operate cel type telephone proper in a tooth space. The conditions from which some differ influence the design of the antenna of these form. That it can attach so that it may not be conspicuous in the ease of low cost, manufacture, and an assembly, the ease of installation, and a tooth space, the high performance covering desired bandwidth, a proper front-to-back ratio (FBR), and dependability are included in these conditions.

[0003] The antenna of the current technique of this form contains a triangular dipole, 90E corner reflector antenna, allene micro fill (Allen MicroFill) inside-of-a-house antenna model NO.DB781 and a radome antenna like DB791, and a SHUNA (Suhner) side type antenna well-known to this contractor. However, the existing antenna is improvable so that one or more of the desirable descriptions mentioned above may be raised. For this reason, one purpose of this invention is offering the inside-of-a-house antenna which can operate in the frequency range of the cel-like band which has the remarkable improving point which surpasses the design of a current antenna technique.

[0004]

[Summary of the Invention] According to instruction of this invention, low cost, manufacture, and an assembly are easy, and installation is easy, and the cel-like band antenna for indoor which has the engine performance superior to the antenna which exists in the technical field concerned, and which can be compared is indicated. This antenna is equipped with metal outside housing containing a slanting flank panel, a trapezoid top panel and a pars-basilaris-ossis-occipitalis panel, and the posterior part panel of the rectangle which demarcates the corner gestalt of 90E truncated cone form. By making it slide under the long clip formed to the flank panel, a radome is arranged in the upper part by the side of before housing. The antenna dipole was attached in housing and this antenna dipole is equipped with two dipole members each other arranged so that it may be a mirror image substantially except for slight difference. Each of a dipole member is equipped with a dipole element, a rectangular long and slender transmission balun (balun) member, and a rectangular posterior part anchoring plate. The transmission balun member receives mutually and is parallel, and only a predetermined distance is separated so that electromagnetic association can be offered between dipole members. An antenna cable penetrates the top panel of housing, is extended, and is connected to an external antenna through distribution apparatus. the outside of a cable — a conductor is electrically connected to one transmission balun member of a dipole member — having — moreover, the inside — a conductor is electrically connected to the dipole element of the same dipole member. the inside of a cable — a conductor and an outside — a conductor is attached in a dipole part by the connector formed from the dipole member. The further purpose, advantage, and the description of this invention will become clear from the following explanation and the publication of a claim, when it refers to

with an accompanying drawing.

[0005]

[Detailed explanation of the gestalt of desirable operation] On a property, the following desirable explanation of the gestalt of operation about the economical cel-like band antenna for indoor passes only to an example, and does not mean restricting this invention, application, or its use in any way. Especially the antenna of this invention is explained to an internal tooth space like the room of a hotel, or an office building useful as an antenna which can operate on the frequency of cel type telephone. However, a special design and the special description of the antenna of this invention have the application large as an object for other cel-like bands like use of the antenna of other form, and PCS and GSM.

[0006] Drawing 1 is the perspective view of the cel-like band antenna 10 by the gestalt of operation of this invention. This antenna 10 is equipped with metal outside housing which contains to the electromagnetic radiation of the target wavelength, the covering 14 made from plastics, i.e., the radome, which is permeability. Although the same perspective view of the antenna 10 shown in drawing 1 is illustrated by drawing 2, the radome 14 is removed in order to expose the antenna dipole 16 in housing 12. As explained below, the antenna dipole 16 is the design of the characteristic and economical antenna containing the dipole element of the rectangle which the antenna engine performance is raised, and can manufacture easily [ are low cost and ], and offers other advantages.

[0007] The perspective view of housing 12 from which the radome 14 and the antenna dipole 16 were removed is illustrated by drawing 3. Housing 12 has the trapezoid top panel 18 and the pars-basilaris-occipitalis panel 20 which countered, and the slanting flank panels 22 and 24 by which a radome 14 to the posterior part panel 26 is extended so that it may illustrate. If the combination object of the flank panels 22 and 24 and the posterior part panel 26 demarcates the corner gestalt of the truncated cone form of 90E, and the posterior part panel 26 is removed and the flank panels 22 and 24 are lengthened, the flank panels 22 and 24 cross at an angle of 90E. The combination object of the flank panels 22 and 24 is constructed as the top panel 18 and the pars-basilaris-occipitalis panel 20, and the posterior part panel 26, with \*\*\*\*\*, turns electromagnetic radiation to a radome 14, and reflects, and the front-to-back ratio (FBR) of an antenna is increased.

[0008] A series of installation slots 28 made into the special gestalt penetrated the posterior part panel 26 and the flank panels 22 and 24, and are extended, and, for this reason, an antenna 10 can be attached in the location where the corner section of the room is not conspicuous quickly and easily according to \*\*\*\* etc. The clip 30 of "J typeface" is formed in side attachment walls 22 and 24 in each corner of a radome 14, and, for this reason, a radome 14 can be attached in housing 12 by making it slide between a clip 30, the top panel 18, and the pars-basilaris-occipitalis panel 20. The enlarged drawing of a clip 30 is illustrated by drawing 4. The opening 34 circular at the end face side of the posterior part panel 26 is formed in the top panel 18 that it should permit being extended in housing 12 so that it may explain to a detail by the following, and the coaxial antenna cable 36 may connect with the antenna dipole 16. Housing 12 is formed of economical metal rolling, cutting, and/or a punching process.

[0009] Drawing 5 shows a before [ the antenna dipole 16 removed from housing 12 ] side perspective view, and drawing 6 shows the back perspective view. The antenna dipole 16 has the first dipole member 42 and the second dipole member 44. These dipole members 42 and 44 are mirror images mutually except for slight difference clear from explanation and a drawing. The perspective view from which the member 42 which dissociated from the dipole 16 and connected with the cable 36 differs is illustrated by drawing 7 thru/or drawing 9. The perspective view of the dipole member 44 separated from the dipole 16 is illustrated by drawing 10. The dipole member 42 has the dipole element 46, the rectangular long and slender transmission balun member 52, and the rectangular installation base plate 54. The dipole element 46, the transmission balun member 52, and the base plate 54 are formed by the single piece of a conductive metal like aluminum formed in a configuration which is bent and illustrated. The bolt 56 of a pair penetrates the base plate 54, is extended, and the dipole member 42 is attached in the posterior part panel 26 in the condition of having contacted electrically.

[0010] The dipole member 44 contains the same component substantially with the dipole member 42 which has the dipole element 58, the rectangular transmission balun member 59, and the rectangular base plate 61. The dipole elements 46 and 58 are unipolar elements when it dissociates. Two dipole elements 46 and 58 are substantially arranged in the same flat surface, and the orientation is carried out towards the radome 14. Two long and slender parallel transmission members 52 and 59 of the dipole members 42 and 44 form a balun. Members 52 and 59 connect the dipole members 42 and 44 and an electric lead wire to elements 46 and 58 electromagnetic so that it may dissociate mutually and he can understand only a predetermined distance to this

contractor based on the target frequency band. Spacing between the dipole members 42 and 44, the gestalt of these dipoles member, and the configuration of members 46 and 58 permit that an antenna 10 operates to high performance with the bandwidth indicated on these specifications.

[0011] A cable 36 is the lead wire to the electromagnetic radiation which was connected to the dipole member 42, and transmitted electromagnetic radiation to the antenna 10, and the antenna 10 received. a cable 36 — the inside — a conductor 60 and an outside — it has the conductor 62. an outside — the conductor 62 is electrically connected to the dipole member 42 by the installation tab 64 of the pair formed so that punching might be carried out from the transmission balun member 52 and it might illustrate. drawing 11 — an outside — the conductor 62 is not attached — it attaches and one notch sectional view of a tab 64 is illustrated.

[0012] the inside — a conductor 60 and an outside — the insulating layer 66 between conductors 62 penetrated the balun member 52, and is extended along with the die length in between the balun member 52 and 59. the metal sequestrum (stand-off) 68 formed in the notch part of the balun member 52 — the inside of a cable 36 — a conductor 62 and an insulating layer 66 are held to the position to the balun member 52. in order to hold a conductor 62 in a proper location so that it may illustrate — the balun member 52 and the inside — the foaming spacer 67 is arranged between conductors 62. The metal sequestrum 69 formed from the notch part of the balun member 59 serves to offer proper spacing among the balun members 52 and 59 again. Furthermore, a connection intercept 71 like Ty lap (Ty-Rap) can be wound around the surroundings of the balun member 52, and dimensional integrity can also be offered. the sequestrum 68 and a spacer 67 — the inside — it is especially designed so that a conductor 60 can be arranged in the desirable separation location between the balun member 52 of the dipole member 42, and the balun member 59 of the dipole member 44.

[0013] the inside — a conductor 60 penetrates the balun member 52 and is back connected electrically to the rectangular dipole element 46 by elongation and the connector 70 of the pair formed by keeping pushing some elements 46 so that it might illustrate. One notch sectional view of a connector 70 is illustrated by drawing 12 .

[0014] The gestalt of an antenna 10 and a design bring about many advantages to the antenna of this form of the conventional technique, as mentioned above. Especially the antenna 10 is low cost and offers the electrical order which manufacture and an assembly were easy, and was easy to attach, and was excellent. The gestalt of the rectangular dipole elements 46 and 58 and the antenna dipole members 42 and 44 enables actuation of high performance within the limits of 800 thru/or 1050MHz. An antenna 10 has the outstanding gain of 8.0 or more dBis, and has the outstanding front-to-back ratio 20dB or more within the limits of 780 thru/or 960MHz within the limits of 25dB or more, 960, or 1050MHz. Furthermore, an antenna 10 has a 3dB beam width azimuth side in 70E thru/or 80E, and 3dB beam width elevation angle side in 55E thru/or 70E. VSWR covering [ impedance ] the shape of a straight line, 800, or the range of 1050MHz in 50 ohms and a polarization condition is 1.5 or less times of an antenna 10.

[0015] In the gestalt of one operation, an antenna 10 has the following dimension to the engine performance mentioned above. A radome 14 is a 228.6mm(9 inches) x228.6mm (9 inches) rectangle. The posterior part panel 26 is arranged at the core, and has width of face of 43.18mm (1.7 inches). The die length of a clip 30 is 6.604mm (0.26 inches), and spacing is 1.778mm (0.07 inches). The vertical distance from the radome 14 to the posterior part panel 26 is 92.075mm (3.625 inches). The dipole elements 46 and 58 are 180.34mm (7.1 inches) in die length, and are 1.575mm (0.062 inches) in width of face of 75.235mm (2.962 inches), and thickness. The die length of the balun members 52 and 59 is 91.059mm (3.585 inches), and the width of face in the maximum narrow point is 25.4mm (1.0 inches). The base plate 54 is a 38.1mm (1.50 inches) rectangular head. Clips 64 and 70 and the sequestrum 68 are altogether arranged in the main location to the width of face of the dipole element 46, and the width of face of the balun member 52, and are in the distance of 90.17mm (3.55 inches) from the crowning and pars basilaris ossis occipitalis of the dipole element 46. Only 5.334mm (0.21 inches) is [ elongation and the width of face of the sequestrum 68 ] 5.08mm (0.2 inches) from the balun member 52. A clip 70 is about 9.398mm (about 0.37 inches) in die length, and offers about 1.778mm (about 0.07 inches) opening to an inner flexible shaft 60. A clip 62 offers 2.286mm (0.09 inches) opening.

[0016] The above-mentioned explanation is a thing of this invention which only indicates and explains the gestalt of operation of an example. It will be understood easily that it is possible to succeed in various configurations, the example of an alteration, and the example of modification, without deviating from the pneuma and the range of this invention which this contractor indicated from the publication of the above-mentioned explanation, an accompanying drawing, and a claim to the claim.



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DESCRIPTION OF DRAWINGS

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## [Brief Description of the Drawings]

[Drawing 1] It is the perspective view of the cel-like band antenna for indoor by the gestalt of one operation of this invention.

[Drawing 2] It is the perspective view of the antenna illustrated to drawing 1 which removed before side covering.

[Drawing 3] It is the perspective view of housing of the antenna illustrated to drawing 1 in which before side covering does not exist.

[Drawing 4] It is the notch Fig. of the housing clip which holds covering to housing of the antenna illustrated to drawing 1.

[Drawing 5] It is a before [ the antenna dipole containing two dipole elements of the configuration of the rectangle removed from housing of an antenna ] side perspective view.

[Drawing 6] It is a backside [ the antenna dipole of the antenna illustrated to drawing 5 ] perspective view.

[Drawing 7] It is one perspective view of the dipole member of the dipole illustrated to drawing 5 showing the connection condition of an antenna cable.

[Drawing 8] It is the perspective view of the dipole member in the connection condition of drawing 7.

[Drawing 9] It is the perspective view of the dipole member in the connection condition of drawing 7.

[Drawing 10] It is the perspective view of other dipole members of the dipole illustrated to drawing 5.

[Drawing 11] the outside of an antenna cable — it is the notch sectional view of the clip which is used in order to hold a conductor and which it kept pushing.

[Drawing 12] the inside of an antenna cable — they are some [ one ] notch sectional views of the dipole element in which the connector to a conductor which it kept pushing is shown.

## [Description of Notations]

10 Antenna 12 Housing

14 Radome 16 Antenna Dipole

18 Top Panel 20 Pars-Basilaris-Ossis-Occipitalis Panel

22 24 Flank panel 26 Posterior part panel

28 Slot 30 Clip

34 Opening 36 Coaxial Antenna Cable

42 First Dipole Member 44 Second Dipole Member

46 58 Dipole element 52 59 Transmission balun member

54 61 Base plate 56 Bolt

60 Inside — Conductor — /Inner Flexible Shaft 62 Outside — Conductor — /Clip

64 Installation Tab / Clip 66 Insulating Layer

67 Foaming Spacer 68 69 Metal Sequestum

70 Connector/Clip 71 Piece of Connection

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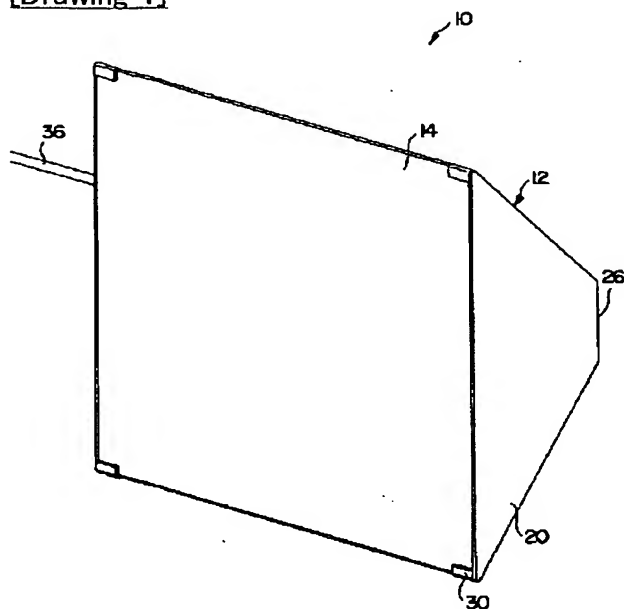
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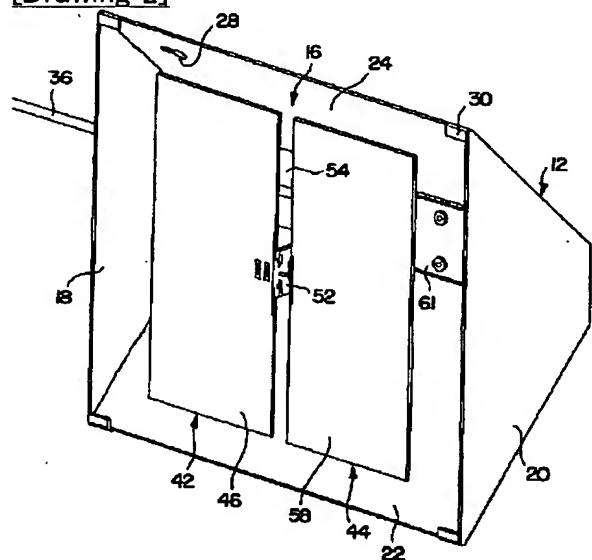
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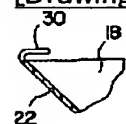
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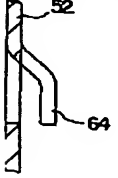
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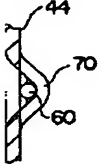
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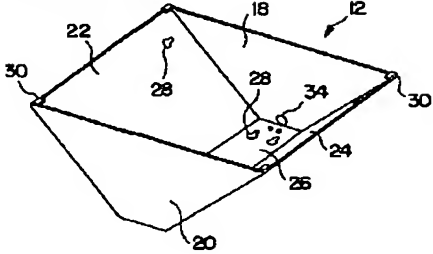
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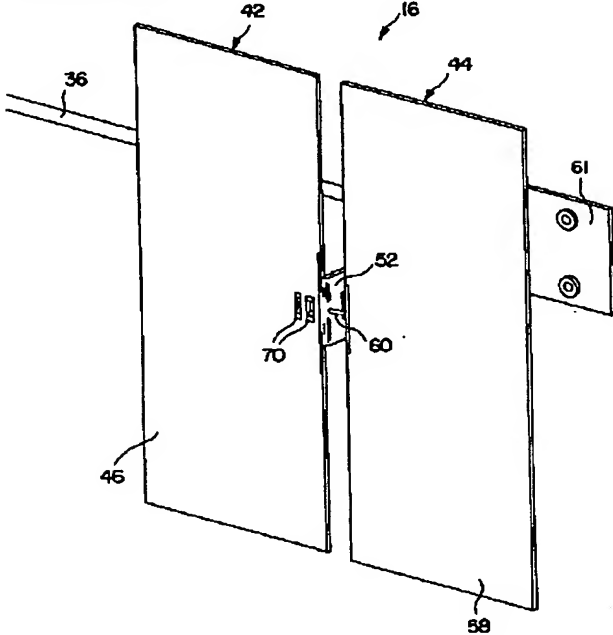
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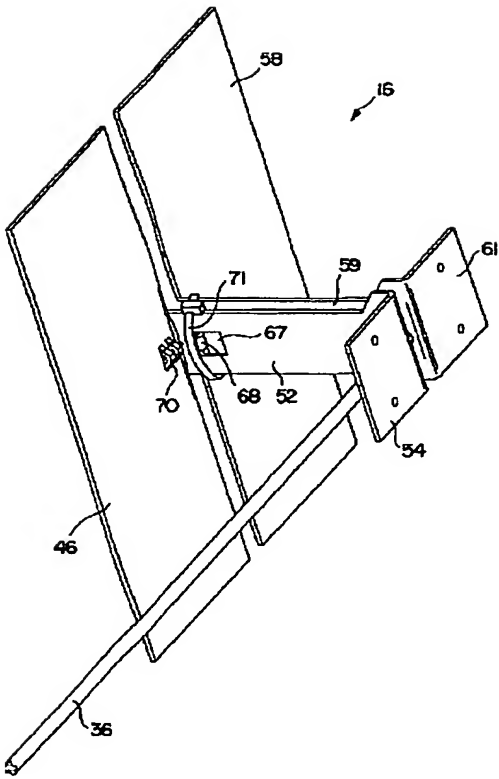
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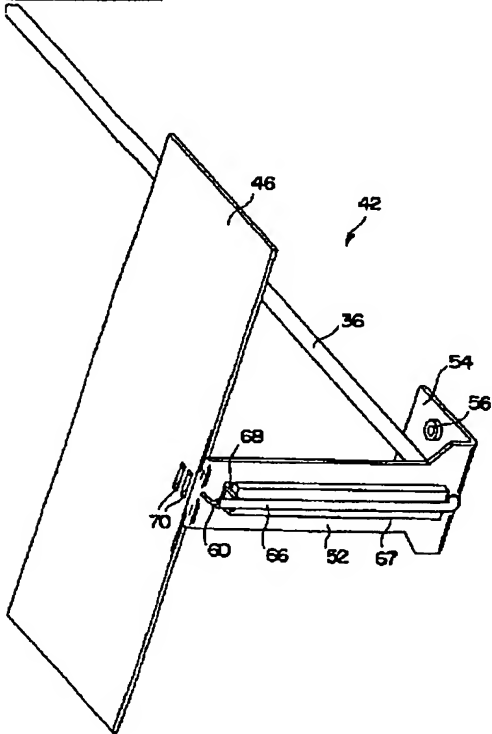
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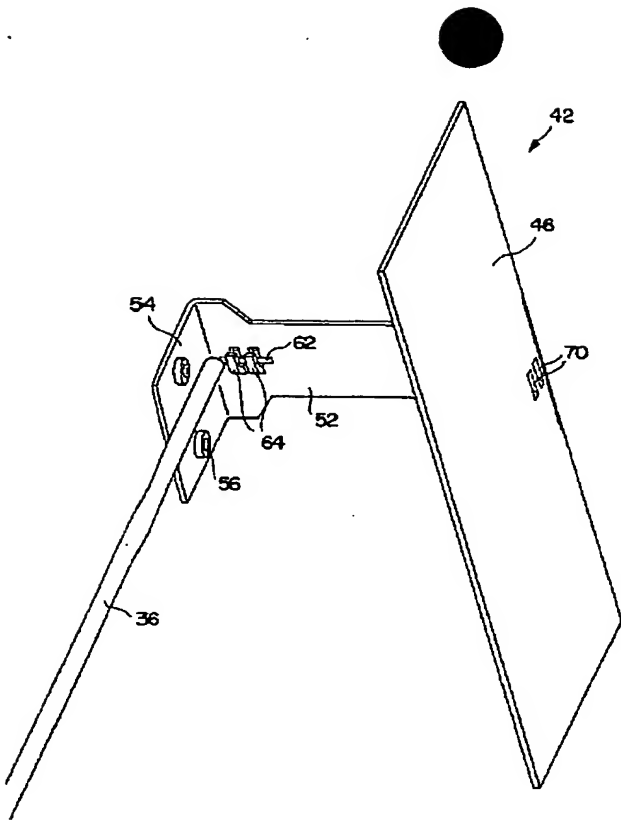
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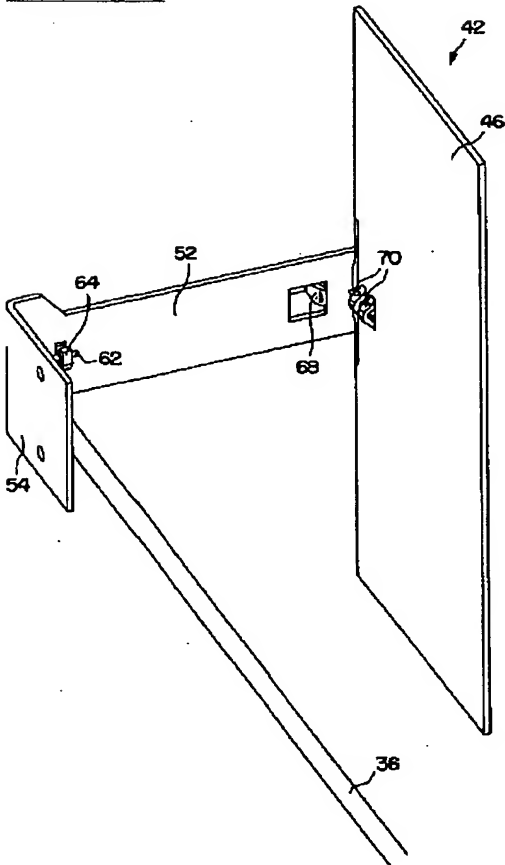
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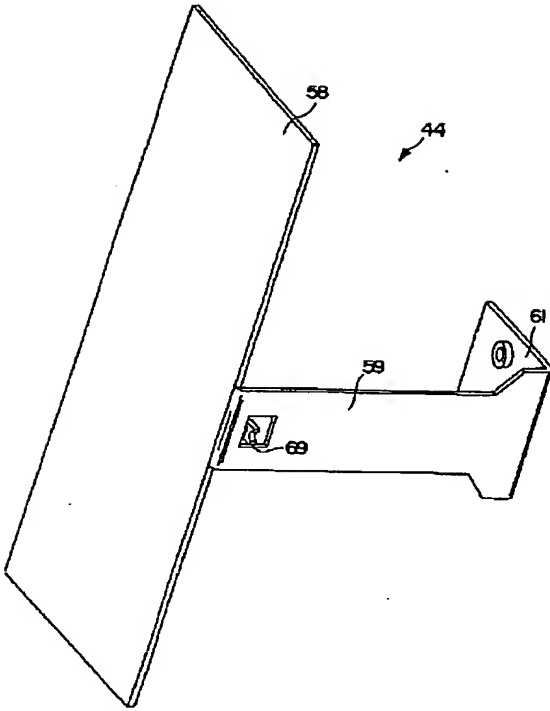
[Drawing 8]



[Drawing 9]



[Drawing 10]



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